REVIEWS AND ABSTRACTS OF LITERATURE

Animal Intelligence: Experimental Studies. EDWARD L. THORNDIKE. *The Animal Behavior Series.* New York: Macmillan. 1911. Pp. viii + 297.

All psychologists will be glad to have Thorndike's experimental work on the intelligence of animals brought together in this convenient form. The thesis on "Animal Intelligence," which was for many of us the first intimation that a real science of comparative psychology was possible, has been for some time out of print. It is here reprinted, together with the paper on "The Instinctive Reactions of Young Chicks," the "Note on the Psychology of Fishes," and the monograph on "The Mental Life of the Monkeys." To these papers there have been added an introductory chapter, an essay on "Laws and Hypotheses of Behavior," and one on "The Evolution of the Human Intellect."

It is the new chapters, of course, that demand discussion in the present review. Thorndike's experimental researches have now undergone the test of time, and their influence has been valuable enough to satisfy any worker in a scientific field: few doctors' theses, indeed, have been so fruitful as "Animal Intelligence." The introductory chapter in the present book defends the study of behavior as opposed to that of "consciousness as such." The chapter on "Laws and Hypotheses for Behavior" proposes, as laws of behavior in general, that behavior is predictable, that "every response or change in response of an animal is the result of the interaction of its original knowable nature and the environment"; and the law of instinct, that "to any situation an animal will, apart from learning, respond by virtue of the inherited nature of its reception-, connection-, and action-systems." All learning can be brought under the law of effect, that "of several responses made to the same situation, those which are accompanied or closely followed by satisfaction to the animal will, other things being equal, be more firmly connected with the situation, so that, when it recurs, they will be more likely to recur;" the reverse being true of responses accompanied by discomfort; and the law of exercise, that "any response to a situation will, other things being equal, be more strongly connected with the situation in proportion to the number of times it has been connected with that situation and to the average vigor and duration of the connections. The satisfaction and discomfort mentioned in the law of effect are correlated with advantage and disadvantage, not necessarily to the organism as a whole, but to its neurones." Accessory conditions to the laws of effect and of exercise are the closeness with which the satisfaction is associated with the response, and "the readiness of the response to be connected with the situation." The chief point at which the reviewer would take issue with the author in this chapter concerns the relation between an act and the idea of an act. As is well known, Thorndike opposes the doctrine that an idea of a movement causes the movement. The reviewer, for whom this doctrine is one of the really valuable and fruitful discoveries of modern psychology, has long felt that its critics misunderstood the meaning of the term "movement idea," and the arguments put forward in the chapter under consideration confirm this opinion. Take for instance the following: "It is certain that in at

least nine cases out of ten a response is produced, not by an image or other representation of it, but by a situation nowise like it or any of its accessories. Hunger and the perception of edible objects far outweigh ideas of grasping, biting, and swallowing as causes of the eating done in the world." It is surely sufficient to reply that the doctrine of the movement idea is applied to the perfecting of new responses, not to the performance of instinctive responses, and that of course even in new responses the place of the movement idea is commonly later taken by an associated idea or perception. "It is also certain," the author continues, "that the idea of a response may be impotent to produce it. I can not produce a sneeze by thinking of sneezing. And, of course, one can have ideas of running a mile in two minutes, jumping a fence eight feet high, or drawing a line exactly equal to a hundred millimeter line, just as easily as of running the mile in ten minutes, or jumping four feet. It is further certain that the thought of doing one thing very often results in the man's doing something quite different. The thought of moving the eyes smoothly without stops along a line of print has occurred to many people, who nevertheless actually did as a result move the eyes in a series of jumps with long stops." The sneeze, of course, as a reflex, may be left out of consideration; nobody ever claimed that movement ideas produced reflexes. As for the other instances adduced, it is sufficient to say that no one has ever had an idea of running a mile in two minutes, or of any of the other impossible feats mentioned, or of moving the eyes smoothly along a line of print. The ideas which people may have thus labeled would be revealed by even a moderate degree of introspective analysis to be ideas of movements that had actually been performed by the persons entertaining the ideas. A movement idea is the revival, without peripheral stimulation, of the sensations that resulted from the actual performance of the movement: if the movement has never been performed, its idea is impossible.

Further, Professor Thorndike appears to think that the admission of the law that the idea of a movement can cause the performance of the movement would add a third principle of learning to the laws of effect and exercise. It would never have occurred to the reviewer not to see in the law of the movement idea a striking instance of the law of effect. It is of course always understood that a movement idea will not produce the corresponding movement if it or any of the associated processes that may be substituted for it has been connected with sufficiently strong unpleasantness. Just as an outside stimulus that by virtue of an inherited nervous connection naturally produces a movement may cease to do so if the movement has unpleasant consequences, so may a movement idea lose its movement-generating power. And the movement idea is itself based on the most immediate effect of the movement; the sensations, kinesthetic and otherwise, that are aroused by the motor process as it takes place.

In the last chapter, on "The Evolution of Human Intellect" the writer points out that the superiority of the human mind consists in the power of analyzing situations, which, in turn, depends on "the increased delicacy and complexity of the cell structures in the human brain."

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